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MAGNETIC TREATMENT DEVICE FOR LIQUIDS

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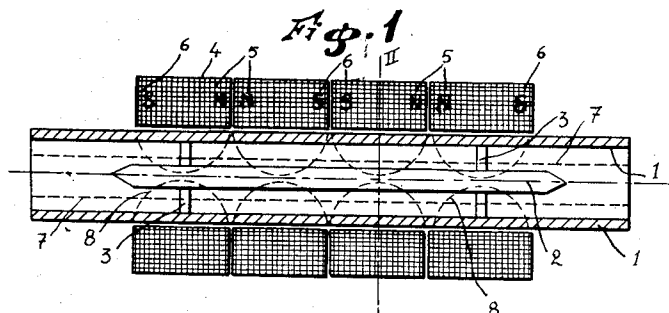


Fig. 2

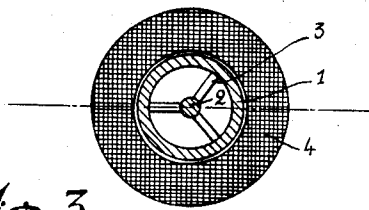


Fig. 3

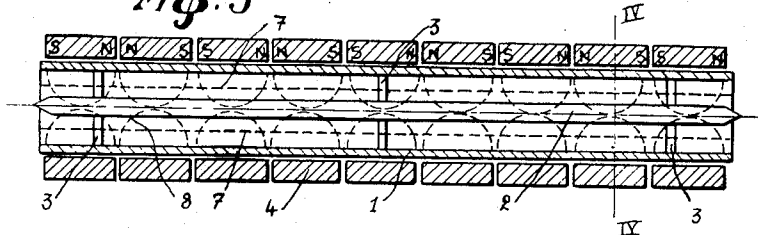
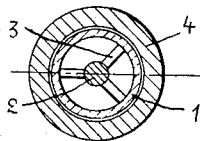


Fig. 4



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MAGNETIC TREATMENT DEVICE FOR LIQUIDS

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In Belgium December 24, 1948

3 Claims. (Cl. 210—1.5)

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The present invention relates to a device for the treatment of liquids giving rise to the formation of calcareous incrustations, for example water, this device being provided with means for producing a magnetic field and a passage for the liquid to be treated.

Belgian Patent No. 460,560 relates to a device of this kind the operation of which is very good but which is not suitable for all cases. In practice, this known device requires an alternating current supply.

The present invention has for its object to provide a device which does not necessarily require a supply of alternating current and the efficiency of which exceeds that of the device according to the above-mentioned Belgian patent.

The applicant has observed that in order to obtain a good result the jets of liquid must cut normally the lines of force of the magnetic field. In addition, the direction of the lines of force which are successively cut must vary. According to the above mentioned patent, this variation is obtained by supplying with alternating current the solenoid producing the magnetic field. In the device made according to the patent a field fixed in space but variable in time was therefore produced.

According to the present invention the magnetic field is fixed in time, but the direction of the lines of force varies a number of times in space over the whole length of the passage of the liquid to be treated.

To this end the device according to the present invention comprises a number of magnetic circuits, the passage above referred to being provided in such a way that the liquid jets are arranged to cut successively in a substantially perpendicular manner the lines of force of the magnetic fields corresponding to the magnetic circuits above referred to.

In one advantageous constructional form of the subject of the invention, the device comprises at least two solenoids the axes of which are disposed substantially as extensions of each other, the adjacent poles of these solenoids being of the same polarity and the above mentioned passage being provided inside these solenoids.

In a preferred constructional form, the device according to the invention comprises a part having high magnetic permeability, this part being located substantially in the axis of the solenoids.

Other details and features of the invention will be apparent from the following description of different constructional forms of a device for the treatment of liquids giving rise to the forma-

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tion of calcareous incrustations, for example of water, given by way of non-limiting example and with reference to the accompanying drawings.

Fig. 1 is a view in section of a device according to the invention.

Fig. 2 is a view in section taken on line II—II of Fig. 1.

Fig. 3 is a view in section of another device according to the invention.

Fig. 4 is a view in section taken on line IV—IV of Fig. 3.

In the different figures similar reference numerals denote similar parts.

The device according to Figs. 1 and 2 comprises a pipe 1 inside which is disposed a part 2 of high magnetic permeability. This part 2 is located substantially in the axis of the pipe 1; it is maintained by a number of elements 3 made from a non-magnetic material.

The pipe 1 is moreover surrounded by a number of solenoids 4 which can be supplied, either by alternating current, or by direct current. The adjacent poles of the different solenoids have the same polarity. The poles of one sign are denoted 5, the poles of the other sign by 6.

It will be readily understood that lines of force of the magnetic field have the shape illustrated in Fig. 1. In practice the part 2 of high magnetic permeability facilitates the concentration of the lines of force. It is to be noted that the liquid jets, such as 7, successively cut in a substantially perpendicular manner the lines of force, such as 8, of the magnetic fields produced by the different solenoids.

The device according to Figs. 3 and 4 approximates substantially to the device according to Figs. 1 and 2. The solenoids have however been replaced by magnets of annular shape; the poles of these magnets are located in planes perpendicular to the axis of the rings. It will be readily understood that the operation of the device according to Figs. 3 and 4 is identical with that of the device shown in Figs. 1 and 2.

It is to be observed that each one of the devices above described comprises a number of magnetic circuits, whilst the passage of the liquid to be treated is provided in such a way that the liquid jets are arranged successively to cut in a substantially perpendicular manner the lines of force of the magnetic fields corresponding to these magnetic circuits.

The treatment of a liquid with the device according to the present invention has in particular the same advantages as a treatment with the

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device according to the Belgian Patent No. 460,560. In practice, the liquid treated by these devices no longer gives rise to the formation of calcareous incrustations. Further, if this liquid passes through an apparatus having incrustations, these latter are dispersed. If treated liquid passes for example through a pipe having incrustations, the latter are dislodged and can readily be removed in the form of mud.

It is to be understood that the invention is in no way limited to the constructional forms above described and that many modifications may be made thereto, in particular to the shape, the construction, the number and arrangement of the parts entering into its construction, without departing from the scope of the present patent application, on condition that these changes are within the scope of the following claims.

I claim:

1. An apparatus for the treatment of calcareous water comprising a pipe, a series of axially aligned annular magnetic devices, each of said magnetic devices having magnetic poles at the ends thereof, said annular magnetic devices surrounding said pipe and positioned with like poles of adjacent devices juxtaposed, and an elongated core of high magnetic permeability concentrically positioned within said pipe for facilitating the concentration of the lines of force of the fields produced by said magnetic devices, said core being of such size and shape as to minimize restriction of flow of water through the pipe and to draw the magnetic lines of force transversely of the direction of flow of the water.

2. An apparatus for the treatment of calcareous water comprising a pipe, a series of axially aligned solenoids surrounding said pipe and positioned with like poles of adjacent solenoids

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juxtaposed, and an elongated core of high magnetic permeability concentrically positioned within said pipe for facilitating the concentration of the lines of force of the fields produced by energizing said solenoids, said core being of such size and shape as to minimize restriction of flow of water through the pipe and to draw the magnetic lines of force transversely of the direction of flow of the water.

3. An apparatus for the treatment of calcareous water comprising a pipe, a series of axially aligned annular magnets, each of said magnets having magnetic poles at the ends thereof, said annular magnets surrounding said pipe and positioned with like poles of adjacent magnets juxtaposed, and an elongated element of high magnetic permeability concentrically positioned within said pipe for facilitating the concentration of the lines of force of the fields produced by said magnets, said core being of such size and shape as to minimize restriction of flow of water through the pipe and to draw the magnetic lines of force transversely of the direction of flow of the water.

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